

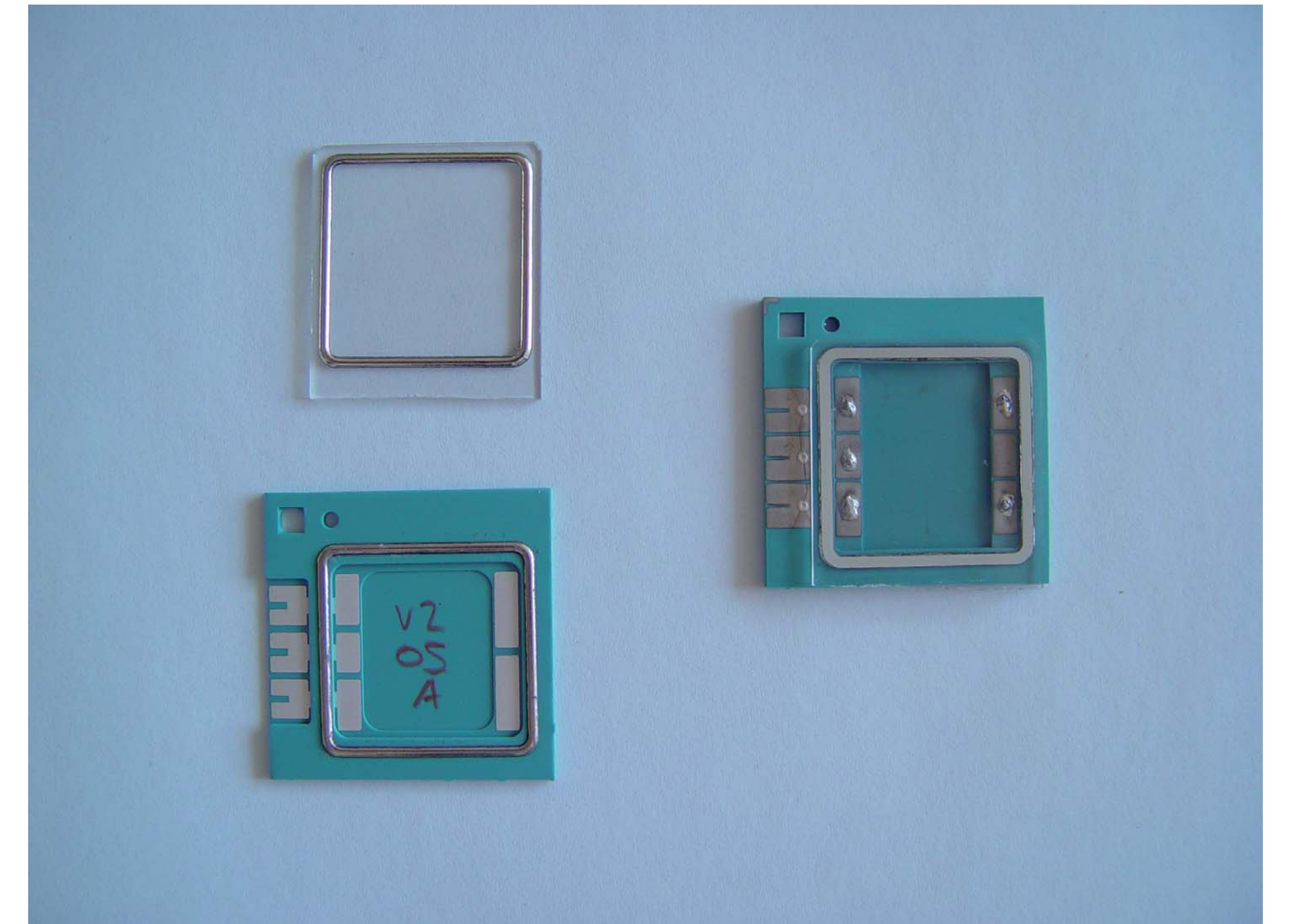
Laser Soldering of LTCC Hermetic Packages with Minimal Thermal Impact

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Goal of the project

The goal of the project is to develop a hermetic packaging method for microsystems, which fulfils the following requirements:

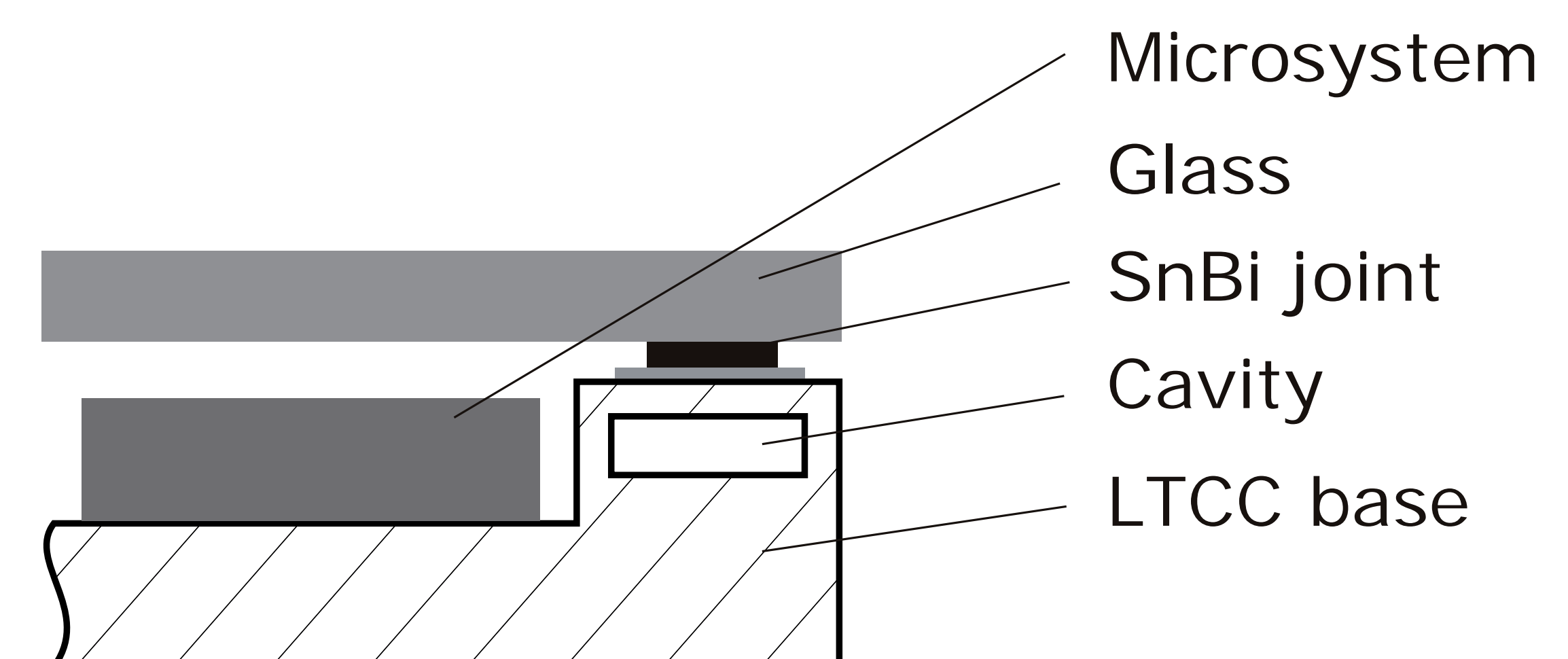
- Achieve long-term hermeticity to water and oxygen
- Achieve long-term protective atmospheres
- Minimise thermal impact on the microsystem during the sealing operation



Thermal Impact Reduction

The idea is to reduce the conduction in the LTCC base, by creating cavities. These cavities are positioned between the soldered joint and the microsystem. The cavities are created by structuration of the LTCC tapes.

The joint is heated by a laser diode, and the temperature is measured by a pyrometer at the center of the package. The effect of the position of the cavities on the temperature was also tested.



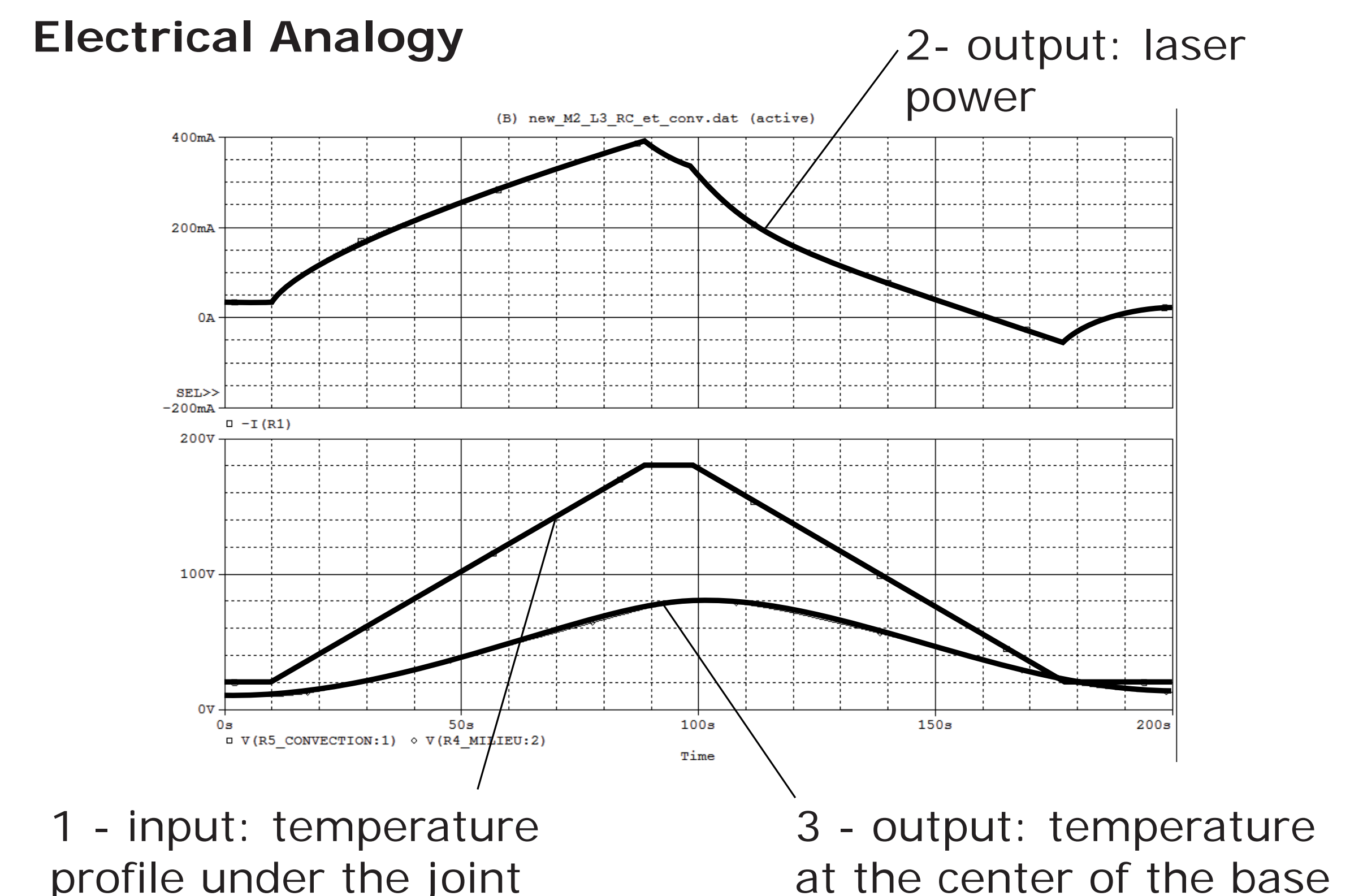
Models

Three approaches are used to determine the heating profile at the center of the package:

- analytical model
- numerical simulations
- electrical analogy

Electrical analogy allows to estimate the effect of the cavities when a given heat flux is applied to the system. This also allows to determine the laser power profile needed to follow the given profile.

Electrical Analogy



Results and future work

- Cavities increase thermal resistance, but they reduce thermal capacity of the package
- Cavities decrease the heating of the microsystem during the soldering operation
- Placing the microsystem on a structure that increases thermal resistance still has to be tested

Heating of the center of the package

